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EXAMINER	
WOLDEMARIAM, AKILILU K	

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2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	**Application No.** 10/716,253	**Applicant(s)** CHAPOULAUD, ERIC	
	Examiner AKLILU k. WOLDEMARIAM	**Art Unit** 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _23 January 2009_.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-38_ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-38_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _17 November 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _06/28/2004, 11/17/2003_.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on 01/23/2009 has been entered. Claims 1-2 have been amended. Claims 1-38 are still pending, claims 1 and 20 being an independent.

Response to Arguments

2. Applicant's arguments filed on 01/23/2009 have been respectfully considered, but they are not persuasive. Applicant argued about claim limitation, "forming patches around the image pixel groups using the at least one processor, wherein each patch is dimensioned and positioned to entirely contain one of the image pixel groups; and performing a patch merge process that merges any two of the patches together that meet a predetermined proximity threshold relative to each other to form a merged patch that is dimensioned and positioned to entirely contain the two merged patches, wherein the merge process continues for any of the patches and the merged patches meeting the predetermined proximity threshold until none of the patches and the merged patches meet the predetermined proximity threshold." Examiner disagreed with applicant's argument because forming patches around the image pixel groups using the at least one processor, wherein each patch is dimensioned and positioned to entirely contain one of the image pixel groups *(see paragraph [0043] to define local areas (patches) containing particles of interest. The boundary of each particle is identified and defined, and used to extract the picture data for each particle from the larger field)*; and

performing a patch merge process using the at least one processor that merges any two of the patches together that meet a predetermined proximity threshold relative

to each other to form a merged patch that is dimensioned and positioned to entirely contain the two merged patches, wherein the merge process continues for any of the patches *(see paragraph [0043] to define local areas (patches) containing particles of interest. The boundary of each particle is identified and defined and used to extract the picture data for each particle from the larger field, thereby producing digital patch images that each contain the image of an individual particle interest and imaging system 2 and first processor 4 combine to perform the first step (collection of individual images), [0047] a threshold routine is used to detect the edges, whereby the locations where the intensity crosses a predetermined threshold are defined as edges [0048] and [0050]),* and the merged patches meeting the predetermined proximity threshold until none of the patches and the merged patches meet the predetermined proximity threshold *(see paragraph [0047] a threshold routine is used to detect the edges, whereby the locations where the intensity crosses a predetermined threshold are defined as edges referred to proximity threshold and, [0048] [0050]).*

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. *Claims 1-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeForest (U.S. Patent number 4, 538,299) in view of Kasdan et al., " Kasdan" (U.S. Publication number 2002/0031255A1).*

Regarding claims 1 and 20, *Deforest discloses* method and an apparatus for automatically locating a boundary of an object of interest in a field of view *(see column 1, lines 55-56)* using an imaging system, the method comprising forming an electronic image of the field of view containing the object, wherein the electronic image is formed of a plurality of image pixels *(see column 1, lines 55-60);*

identifying groups of the image pixels that represent edge segments of the object using at least one processor (*see column 1, lines 55- 61).*

DeForest does not discloses forming patches around the image pixel groups using the at least one processor, wherein each patch is dimensioned and positioned to entirely contain one of the image pixel groups; and performing a patch merge process that merges any two of the patches together that meet a predetermined proximity threshold relative to each other to form a merged patch that is dimensioned and positioned to entirely contain the two merged patches, wherein the merge process continues for any of the patches and the merged patches meeting the predetermined proximity threshold until none of the patches and the merged patches meet the predetermined proximity threshold.

However, *Kasdan discloses* forming patches around the image pixel groups using the at least one processor, wherein each patch is dimensioned and positioned to entirely contain one of the image pixel groups *(see paragraph [0043] to define local areas (patches) containing particles of interest. The boundary of each particle is identified and defined, and used to extract the picture data for each particle from the larger field)*; and

performing a patch merge process using the at least one processor that merges any two of the patches together that meet a predetermined proximity threshold relative to each other to form a merged patch that is dimensioned and positioned to entirely contain the two merged patches, wherein the merge process continues for any of the patches *(see paragraph [0043] to define local areas (patches) containing particles of interest. The boundary of each particle is identified and defined and used to extract the picture data for each particle from the larger field, thereby producing digital patch images that each contain the image of an individual particle interest and imaging system 2 and first processor 4 combine to perform the first step (collection of individual images), [0047] a threshold routine is used to detect the edges, whereby the locations where the intensity crosses a predetermined threshold are defined as edges [0048] and [0050]),* and the merged patches meeting the predetermined proximity threshold until none of the patches and the merged patches meet the predetermined proximity threshold *(see paragraph [0047] a threshold routine is used to detect the edges, whereby the locations where the intensity crosses a predetermined threshold are defined as edges and, [0048] [0050]).*

It would have been obvious to someone of the ordinary skill in the art at the time when the invention was made to use Kasdan's forming patches around the image pixel groups, wherein each patch is dimensioned and positioned to entirely contain one of the image pixel groups in Deforest's automatically locating a boundary of an object of interest in a field of view because it will allow to accurate and automate classification of particles in a sample [*Kasdan, paragraph [0007]].*

Regarding claims 2 and 21, *Kasdan discloses* the method an apparatus of claims 1 and 20, further comprising associating all the edge segments contained within one of the merged patches as representing the boundary of the object *(see paragraph [0043] imaging system 2 and first processor 4 combine to perform the first step (collection of individual images) and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).*

Regarding claims 3 and 22, *Kasdan discloses* the method and an apparatus of claims 1 and 20, wherein the predetermined proximity threshold is a predetermined number of the image pixels shared by any of the patches and merged patches that overlap each other *(see paragraph [0043] imaging system 2 and first processor 4 combine to perform the first step (collection of individual images) and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).*

Regarding claims 4 and 23, *Kasdan discloses* the method and an apparatus of claims 1 and 20, wherein the predetermined proximity threshold is a predetermined distance between any of the patches and merged patches *(see paragraph [0047] a threshold routine is used to detect the edges, whereby locations where the intensity*

crosses a predetermined threshold are defined as edges and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).

Regarding claims 5 and 24, *Kasdan discloses* the method and an apparatus of claims 4 and 23, wherein the predetermined distance is measured from boundaries of the patches and merged patches *(see paragraph [0047] a threshold routine is used to detect the edges, whereby locations where the intensity crosses a predetermined threshold are defined as edges and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).*

Regarding claims 6 and 25, *Kasdan discloses* the method and an apparatus of claims 4 and 24, wherein the predetermined distance is measured from center portions of the patches and merged patches *(see paragraph [0047] a threshold routine is used to detect the edges, whereby locations where the intensity crosses a predetermined threshold are defined as edges and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and*

particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).

Regarding claims 7 and 26, *Kasdan discloses* the method and an apparatus of claims 1 and 20, wherein the predetermined proximity threshold is calculated from the sizes and separation distances of the patches and merged patches *(see paragraph [0047] a threshold routine is used to detect the edges, whereby locations where the intensity crosses a predetermined threshold are defined as edges and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).*

Regarding claims 8 and 27, *Kasdan discloses* the method and an apparatus of claims 1 and 20, wherein the forming of the patches further comprises dimensioning each of the patches as small as possible while still entirely containing one of the image pixel groups *(see paragraph [0047] a threshold routine is used to detect the edges, whereby locations where the intensity crosses a predetermined threshold are defined as edges and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).*

Regarding claims 9 and 28, *Kasdan discloses* the methods and an apparatus of claims 8 and 27, wherein after the dimensioning of the patches as small as possible, the forming of the patches further comprises expanding each of the patches by moving wall portions of the patch away from a center of the patch by a predetermined distance *(see paragraph [0047] a threshold routine is used to detect the edges, whereby locations where the intensity crosses a predetermined threshold are defined as edges and [0048] a mask image is created from the edge 16 in the manner illustrated in FIG.3B. The edge image 16 is inverted so boundary lines are white and the background is black. Then, the image is cleaned of all small specks and particles too small to be of interest. Small gaps in the boundary lines are filled to connect some of the boundary lines together).*

Regarding claims 10 and 29, *Kasdan discloses* the method and an apparatus of claim 9, wherein each of the patches has a rectangular shape *(see paragraph [0043] to define local areas (patches) containing particles of interest. The boundary of each particles is identified and defined, and used to extract the picture data for each particle from the larger field, thereby producing digital patch images that contain the image of an individual particle of interest).*

Regarding claims 11 and 30*, Kasdan discloses* the method and an apparatus of claims 1 and 20, wherein the identifying of the groups of image pixels that represent edge segments of the object comprises forming a background level image of the field of view, wherein the background level image is formed of a plurality of background level pixels each corresponding in location to one of the image pixels and each having a pixel value *(see paragraph [0046] o enhance the particle feature extraction, the particle*

boundary is further refined, and black and white mask images of the particles are created. This process effectively changes all the digital image pixels outside the boundary of the particle (background pixels) to black pixels, and the pixels inside the particle boundary to white pixels. The resulting white images of the particles against a black background conveys the particles' shape and size very clearly, and are easy to operate on for particle features based on shape and size only (given that the pixels are either white or black); and

classifying as an object pixel each of the image pixels having a pixel value that varies by at least a predetermined amount from the pixel value of the corresponding background level pixel *(see paragraph [0010] The present invention is a method of classifying an element in an image into one of a plurality of classification classes, wherein the element has a plurality of features. The method includes the steps of extracting the plurality of features from the image of the element, determining a classification class of the element, and modifying the determined classification class of the element based upon a plurality of previously determined classification class determinations);*

identifying which of the object pixels correspond to an edge of the object *(see paragraph [0032] The present invention comprises a method and apparatus for making decisions about the classification of individual particle images in an ensemble of images of biological particles for the purpose of identifying each individual image, and determining the number of images in each given class of particles).*

Regarding claims 12 and 31, *Kasdan discloses* the method and an apparatus of claims 11 and 30, wherein the forming of the background level image of the field of view further comprises forming N background electronic images of the field of view not containing any objects of interest, wherein each of the background electronic images is formed of a plurality of background pixels each corresponding in location to one of the background level pixels and each having a pixel value, and wherein N is a positive integer *(see paragraph [0046] o enhance the particle feature extraction, the particle boundary is further refined, and black and white mask images of the particles are created. This process effectively changes all the digital image pixels outside the boundary of the particle (background pixels) to black pixels, and the pixels inside the particle boundary to white pixels. The resulting white images of the particles against a black background conveys the particles' shape and size very clearly, and are easy to operate on for particle features based on shape and size only (given that the pixels are either white or black);*

generating each one of the background level pixels by calculating a median value of the pixel values for the background pixels corresponding to the one background level pixel *(see paragraph [0071] The lengths of the radii are collected into a list of Radii Values, and the list is sorted from low to high values. A certain % quantile of an ordered list of values represents the value having a position in the list that corresponds to the certain percentage from the bottom of the list. For example, a 30% quantile of a list is the value that is positioned 30% up from bottom of the list, with 70% of the values being above it in the list. So, in an order list of 10 values, the 30% quantile value is the*

seventh value from the top of the list, and the 50% quantile is the median value of the list).

Regarding claims 13 and 32, *DeForest discloses* the method and an apparatus of claims 12 and 31, wherein the formation of the N background electronic images of the field of view includes flowing transparent fluid through the field of view *(see column 2, lines 30-47).*

Regarding claims 14 and 33, *Kasdan discloses* the method and an apparatus of claims 12 and 31, wherein the forming of the background level image of the field of view further comprises standardizing average values (normalized image value) of the background pixel values for each of the N background electronic images before the generation of the background level pixels (s).

Regarding claims 15 and 34, *Kasdan discloses* the method of claim 14, wherein the standardizing average values (normalized image value) of the background pixel values further comprises creating a histogram for each one of the N background electronic images, wherein each of the histograms has a peak value that corresponds to ma average value of the background pixel values for one of the N background electronic, images *(see paragraph [0070] Skeleton Size normalized by the size of the particle, determined by dividing Skeleton Size by Particle Area);*

selecting a predetermined average pixel value *(see paragraph [0080] the average intensity reveals the overall light absorbing quality of the particle, while the standard deviation of intensity measures the uniformity of the particle's absorbing quality. In order*

to measure intensity, the particle is preferably isolated by using the mask image in order to mask the patch image of the particle); and

adjusting the background pixel values for the N background electronic images so that the histograms thereof all have peak values generally equal to the predetermined average pixel value (*see paragraph [0080] the average intensity reveals the overall light absorbing quality of the particle, while the standard deviation of intensity measures the uniformity of the particle's absorbing quality. In order to measure intensity, the particle is preferably isolated by using the mask image in order to mask the patch image of the particle and [0135] the seventh family of particle features use grayscale and color histogram quanlites of image intensities, which provide additional information about the intensity variation within the particle boundary).*

Regarding claims 16 and 35, *Kasdan discloses* the method and an apparatus of claims 15 and 34, wherein the predetermined average pixel value is selected such that the adjusted background pixel values do not exceed a maximum pixel value thereof (*see paragraph [0132] Pixel Maximum to Average Radial Average Value Ratio: the ratio of the maximum to average radial average values stored in the queue).*

Regarding claims 17 and 36, *Kasdan discloses* the method and an apparatus of claims 11 and 30, wherein the classifying as an object pixel further includes creating a binary image of the electronic image of the field of view containing the object, wherein the binary image is formed of a plurality of binary pixels each corresponding in location to one of the image pixels wherein each of the binary pixels is assigned to a first value if the corresponding image pixel value varies by at least a predetermined amount from the

pixel value of the corresponding background level pixel, and is assigned to a second value if the corresponding image pixel value does not vary by at least the predetermined amount from the pixel value of the corresponding background level pixel *(see paragraph [0010] The present invention is a method of classifying an element in an image into one of a plurality of classification classes, wherein the element has a plurality of features. The method includes the steps of extracting the plurality of features from the image of the element, determining a classification class of the element, and modifying the determined classification class of the element based upon a plurality of previously determined classification class determinations).*

Regarding claims 18 and 37, *Kasdan discloses* the method and an apparatus of claims 17 and 36, wherein the identifying which of the object pixels correspond to an edge of the object includes re-assigning any of the binary pixels assigned with the first value to the second value that are surrounded by others of the binary pixels all originally assigned with the first value *(see paragraph [0032] The present invention comprises a method and apparatus for making decisions about the classification of individual particle images in an ensemble of images of biological particles for the purpose of identifying each individual image, and determining the number of images in each given class of particles).*

Regarding claims 19 and 38, *Kasdan discloses* the method and an apparatus of claims 1 and 20, wherein each of image pixels has a value, and wherein the forming of the electronic image of the field of view containing the object further comprises creating a histogram the electronic image containing the object, wherein the histogram has a

peak value that corresponds to an average value of the image pixel values *(see paragraph [0080] the average intensity reveals the overall light absorbing quality of the particle, while the standard deviation of intensity measures the uniformity of the particle's absorbing quality. In order to measure intensity, the particle is preferably isolated by using the mask image in order to mask the patch image of the particle and [0135] the seventh family of particle features use grayscale and color histogram quantiles of image intensities, which provide additional information about the intensity variation within the particle boundary);*

selecting a predetermined average pixel value *(see paragraph [0080] the average intensity reveals the overall light absorbing quality of the particle, while the standard deviation of intensity measures the uniformity of the particle's absorbing quality. In order to measure intensity, the particle is preferably isolated by using the mask image in order to mask the patch image of the particle);* and

adjusting the image pixel values so that the histogram has a peak value generally equal to the predetermined average pixel value *(see paragraph [0080] the average intensity reveals the overall light absorbing quality of the particle, while the standard deviation of intensity measures the uniformity of the particle's absorbing quality. In order to measure intensity, the particle is preferably isolated by using the mask image in order to mask the patch image of the particle and [0135] the seventh family of particle features use grayscale and color histogram quantiles of image intensities, which provide additional information about the intensity variation within the particle boundary).*

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AKLILU k. WOLDEMARIAM whose telephone number is (571)270-3247. The examiner can normally be reached on Monday-Thursday 6:30 a.m-5:00 p.m EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Samir Ahmed
Examiner
Art Unit 2624

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